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Evaluation of Oral Antidiabetic Medication Adherence Among Diabetes Mellitus Patients in the Outpatient Department of RSUD Prembun in 2022

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ABSTRACT: Diabetes mellitus is a chronic condition characterized by elevated blood glucose levels. At Prembun Regional General Hospital (RSUD Prembun), diabetes mellitus ranks first among the top ten most prevalent diseases. Medication adherence in patients with diabetes mellitus is crucial to prevent the onset of complications. This study aims to determine the level of adherence to oral antidiabetic medication and to examine the association between patient characteristics and medication adherence among diabetes mellitus patients in 2022 at RSUD Prembun. A cross-sectional study design was employed using purposive sampling, involving 85 respondents. The Medication Adherence Report Scale (MARS-10) questionnaire was used as the research instrument to assess medication adherence. Data were analyzed using the Chi-square test via SPSS software. The results showed that out of 85 respondents, 80 demonstrated high adherence, while 5 had low adherence. Significant associations were found between medication adherence and patient characteristics, including gender ($p = 0.048$), the number of medications taken ($p = 0.004$), comorbidities ($p = 0.030$), and duration of illness ($p = 0.026$). In conclusion, there is a statistically significant relationship between medication adherence and patient characteristics, with p-values < 0.05.

Keywords: Diabetes; Adherence; Antidiabetic

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INTRODUCTION

Diabetes mellitus is a chronic condition characterized by elevated blood glucose levels, or hyperglycemia, which is a hallmark feature of the disease (International Diabetes Federation, 2017). In 2019, the global prevalence of diabetes mellitus was 9.3%, affecting an estimated 463 million individuals aged 20–79 years. The Southeast Asia region, which includes Indonesia, ranked third in terms of regional prevalence, with a rate of 11.3%. Among the ten countries with the highest number of diabetes mellitus cases in 2019, Indonesia ranked seventh, with a prevalence affecting approximately 10.7 million individuals. This places Indonesia among the top ten countries with the highest diabetes burden in the Southeast Asian region (International Diabetes Federation, 2017). According to the 2018 Basic Health Research (Riskesdas) report, the prevalence of diabetes mellitus based on physician diagnoses across all age groups in Central Java Province reached 1.6%, amounting to approximately 132,565 individuals. In Kebumen Regency, the prevalence of diabetes mellitus based on physician diagnoses in the same year was reported at 3,162 individuals, placing it fifth among all regencies in Central Java in terms of diabetes prevalence. (Riskesdas, 2018).

The primary goal of diabetes mellitus therapy is to improve patients' quality of life and to prevent the onset of complications. Complication prevention is achieved by maintaining stable blood glucose levels through lifelong, routine treatment, as diabetes mellitus is not a curable condition. Uncontrolled diabetes can lead to various organ complications, including damage to the kidneys, eyes, and nerves, as well as an increased risk of cardiovascular diseases and heart-related conditions (Warsini, 2020). Therapeutic approaches for patients with diabetes mellitus include both non-pharmacological and pharmacological interventions. Non-pharmacological therapy involves health education, which should be provided broadly to the general public, as well as specifically to both newly diagnosed and long-term diabetes patients. It also includes dietary modifications for overweight or obese individuals, and regular physical activity—such as 30-minute exercise sessions performed 3–4 times per week. Pharmacological therapy is initiated when non-pharmacological measures are insufficient or ineffective in maintaining glycemic control. Pharmacological interventions consist of oral antihyperglycemic agents and insulin therapy.

Adherence is a key determinant in achieving the effectiveness of any health intervention. It is often defined as the extent to which a patient is willing and able to follow prescribed health-related behaviors. However, adherence is frequently misunderstood as a passive act, with many healthcare providers assuming that patients will automatically comply with medical instructions. In reality, adherence is an active and intentional process in which patients make their own decisions about whether or not to follow treatment recommendations, including medication intake, independent of direct supervision or prompting from healthcare providers (Warni Emerensiana, 2022). Several factors influence medication adherence, including educational level, age, gender, occupation, duration of illness, number of medications prescribed, presence of comorbidities, income level, adverse effects of medication, patient–physician communication, health literacy, and forgetfulness. According to a study by Nurtalenta Lafau (2021), the majority of diabetes mellitus patients were aged between 40 and 45 years (46.7%). Age was found to be closely associated with increased blood glucose levels among diabetes mellitus patients. As individuals grow older, the risk of developing diabetes mellitus tends to rise, with the aging process itself contributing as a potential factor in the onset of the disease. However, a study

conducted by Novalisa (2021) reported no significant association between medication adherence and clinical outcomes. This finding indicates that even though patients with type 2 diabetes mellitus were categorized as adherent to medication, their adherence did not necessarily correlate with improved clinical outcomes.

RSUD Prembun is a healthcare facility that provides treatment services for diabetes mellitus. In 2018, diabetes mellitus ranked fourth among the top ten most common diseases at RSUD Prembun. In 2019, it rose to third place, and by 2020, it had become the most prevalent condition reported at the hospital (Renstra, 2021). According to a preliminary study, the number of outpatient diabetes mellitus cases at RSUD Prembun was recorded at 331 patients in 2021, increasing to 468 patients in 2022.

Based on this increasing trend, it is necessary to conduct a study evaluating adherence to oral antidiabetic medications among diabetes mellitus patients at RSUD Prembun. This study aims to assess the level of adherence to oral antidiabetic drugs and to examine the association between patient characteristics and medication adherence among diabetes mellitus outpatients in 2022 at RSUD Prembun.

METHODS

The design of this study is a prospective, non-experimental, observational study. Although descriptive analysis is used to summarize the data, it is not sufficient to test the relationship between patient characteristics and medication adherence. Therefore, this study employs an analytical approach with a cross-sectional design to examine the association between independent and dependent variables.

The independent variables include gender, age, education, occupation, number of medications, comorbidities, duration of illness, and income. The dependent variable is the level of adherence to oral diabetes mellitus medication. The study was conducted in March 2023 at RSUD Prembun.

Population and Sample

The population in this study consists of adult diabetes mellitus patients using oral antidiabetic medications and receiving treatment at RSUD Prembun in 2023. The sample used in this study comprises diabetes mellitus patients at RSUD Prembun who meet the inclusion criteria as follow:

1. Diabetes mellitus patients with or without comorbidities.
2. Diabetes mellitus patients who are willing to participate as respondents and complete the questionnaire from the beginning to the end.
3. Patients who have been undergoing treatment for a minimum duration of 1 month, using oral antidiabetic medications.
4. Diabetes mellitus patients aged ≥ 18 years.
5. Diabetes mellitus patients who are prescribed oral antidiabetic medications.

Exclusion criteria are not the opposite of inclusion criteria, but rather conditions where participants meet the inclusion criteria but must still be excluded from the study due to specific reasons. In this study, the exclusion criteria are as follows:

1. Diabetes mellitus patients who do not complete the questionnaire from beginning to end.
2. Patients who have been newly diagnosed with diabetes mellitus.
3. Patients who are unwilling to participate in the study.

Research Instrument

This study uses the Medication Adherence Report Scale-10 (MARS-10) questionnaire, which contains 10 questions developed by Thompson, J. Kulkarni, and A. A. Sergejew to assess the adherence of patients to oral antidiabetic medications. The questionnaire is used to collect data on medication adherence in diabetes mellitus patients (Thompson et al., 2000).

Data Analysis

The data collected from respondents were analyzed using the Chi-Square (χ^2) test with a confidence level of 95% ($\alpha = 0.05$). A p-value of less than 0.05 was considered statistically significant, indicating a meaningful association between the independent variables (such as gender, age, education, occupation, number of medications, comorbidities, duration of illness, income) and the dependent variable, which is the level of adherence to oral antidiabetic medication.

Patient adherence levels were categorized based on the Medication Adherence Report Scale-10 (MARS-10), a validated instrument developed by Thompson et al. (2000). The total score ranges from 0 to 40. In this study, the adherence scores were classified into two categories:

1. High adherence: scores between 21–40
2. Low adherence: scores between 0–20

These categories were used to further examine the distribution and characteristics of respondents with different adherence levels. All results were presented in tabular form to describe the relationship between patient characteristics and adherence to oral diabetes medication at RSUD Prembun during the study period in March 2023.

RESULT AND DISCUSSION

Respondent Characteristics

Based on the research findings, most patients suffering from diabetes mellitus who used oral antidiabetic medications at RSUD Prembun in the age range of 46-60 years were 47 people (55.3%). This result is in line with the study conducted by Mulyani (Mulyani, 2022) which reported that 37 people (41.1%) in the same age range suffered from diabetes mellitus. According to Perkeni (2021), individuals over the age of 40 have a high risk of developing diabetes mellitus. This is due to the increase in glucose levels as people age, which consequently raises the risk of developing diabetes mellitus. As people age, the body's physiological functions tend to decline, contributing to an increased risk of developing diabetes mellitus (PERKENI, 2021). This is because as people age, glucose levels tend to increase, which in turn raises the risk of developing diabetes mellitus. As age increases, the risk of experiencing diabetes mellitus rises due to the decline in physiological functions (Brunner dan Suddarth, 2016a). The data on age and gender characteristics can be seen in Tables 1 and 2.

Table 1. Age Characteristics

Age Group	Number (N)	Percentage (%)
18 – 25 years	0	0
26 – 35 years	0	0
36 – 45 years	14	16.5
46 – 60 years	47	55.3
>61 years	24	28.2
Total	85	100

Table 2. Gender characteristic

Gender	Number (N)	Percentage (%)
Female	49	57.6
Male	36	42.4
Total	85	100

Based on the gender characteristics, most diabetes mellitus patients at RSUD Prembun were female, with 49 respondents (57.6%), while the remaining patients were male, totaling 36 respondents (42.4%). The results of this study are consistent with those of a study conducted by Mulyani (2022), which found that 53 female respondents (58.9%) and 37 male respondents (41.1%) participated. Gender is considered one of the non-modifiable risk factors for diabetes mellitus (Infodatin, 2020).

According to the 2018 Riskesdas, the prevalence of diabetes mellitus is higher in females compared to males. According to Punthakee, females are at a greater risk of developing diabetes mellitus than males (Punthakee et al., 2018). This is because females tend to have a higher body mass index (BMI) compared to males, which is a risk factor for obesity. Additionally, females are more susceptible to fat accumulation within the body due to hormonal processes, as they undergo menstruation and menopause (Soeharto, 2004. Women are also more prone to experiencing stress, which can trigger an increase in the hormone epinephrine. This hormone stimulates the mobilization of glucose, fatty acids, and lactate. As an insulin-antagonist hormone, epinephrine can inhibit insulin action and subsequently affect blood glucose levels (Brunner & Suddarth, 2016b). The data on educational characteristics can be seen in Table 3.

Table 3. Educational Characteristics

Education Level	Number (N)	Percentage (%)
No School	0	0
Elementary School (SD)	49	57.6
Junior High School (SMP)	14	16.5
Education Level	Number (N)	Percentage (%)
No School	0	0
Elementary School (SD)	49	57.6

Based on Educational Characteristics, it shows that most diabetes mellitus patients at RSUD Prembun have completed elementary school, with 49 respondents (57.6%), followed by those with high school/vocational education (SMA/SMK) with 19 respondents (22.4%), junior high school education (SMP) with 14 respondents (16.5%), and the remaining patients have higher education, totaling 3 respondents (3.5%). According to the 2011 Introduction to Public Health book, in wealthy countries, an additional year of

education can reduce mortality rates by approximately 8%, or twice as much, either directly or indirectly.

The Educational Characteristics can influence an individual's learning process. The higher the level of education a person achieves, the more information they can acquire, resulting in greater knowledge. It is expected that higher education will encourage individuals to adopt healthier behaviors and help prevent diseases, including diabetes mellitus, as well as improve dietary habits.

Behavioral changes in individuals can be influenced by knowledge, attitudes, and environmental factors (Notoatmodjo, 2011). Education can also enhance an individual's knowledge and awareness, motivating them to make changes or take actions for health maintenance and improvement, including in the area of treatment (Aditya et al., 2022).

Based on occupation in table 4, the majority of diabetes mellitus patients at RSUD Prembun are housewives (IRT), with 30 respondents (35.3%), followed by farmers with 22 respondents (25.9%), those not working with 10 respondents (11.8%), laborers and civil servants (PNS) with 8 respondents (9.4%) each, entrepreneurs with 5 respondents (5.9%), and others, such as traders and tailors, with 2 respondents (2.3%). One of the contributing factors to the development of diabetes mellitus in an individual is the lack of physical activity (Decroli, 2019). However, in this study, the most common group suffering from diabetes mellitus at RSUD Prembun was housewives (IRT). According to research by Mokolomban (2018), housewives are considered to have a job with relatively light physical activity. The data on occupational characteristics and the distribution of patients based on the number of medications used can be seen in Tables 4 and 5.

Table 4. Occupational Characteristics

Occupation	Number (N)	Percentage (%)
Farmer	22	25.9
Entrepreneur (Wiraswasta)	5	5.9
Housewife (IRT)	30	35.3
Civil Servant (PNS)	8	9.4
Laborer (Buruh)	8	9.4
Not Working	10	11.8
Others	2	2.3
Total	85	100

Table 5. Distribution of Patients Based on the Number of Medications Used

Number of Medications	Number (N)	Percentage (%)
1 medication	29	34.2
2 medications	28	32.9
>3 medications	28	32.9
Total	85	100

Based on the number of medications consumed in table 5, most diabetes mellitus patients at RSUD Prembun used a single medication, totaling 29 respondents (34.2%). Meanwhile, 28 respondents (32.9%) used two or three medications. These findings indicate that many respondents used only one medication. This is consistent with the study conducted by Aditya, which reported that in Rampal Malang Auxiliary Hospital, the highest proportion of patients used a single drug regimen, with a percentage of 23.33% (Aditya et al., 2022b). Patients who receive monotherapy are generally more adherent to their

medication regimen compared to those undergoing combination therapy. Medication adherence is influenced by the number of drugs prescribed, with patients taking fewer medications typically showing higher adherence levels (Prautami & Ramatillah, 2020). Patients who are prescribed a greater number of medications tend to exhibit poorer medication adherence (Rohi, 2020).

The results, as shown in Tables 4 and 5, indicate variations in medication adherence based on occupational background and the number of medications used. of this study indicate that most patients receiving monotherapy demonstrated better adherence compared to those receiving combination antidiabetic therapy. Combination therapy may involve two or three types of antidiabetic medications, which can lead to decreased adherence due to the increased complexity of the medication regimen (Yach, 2003). The data on the distribution of patients based on the presence of comorbidities can be seen in Table 6.

Table 6. Distribution of Patients Based on the Presence of Comorbidities

Comorbidities	Number (N)	Percentage (%)
Present	45	53
Absent	40	47
Total	85	100

Based on Table 6, many diabetes mellitus patients at RSUD Prembun had comorbid conditions, with 45 respondents (53%), while 40 respondents (47%) did not have any comorbidities. Furthermore, among the patients who had comorbidities, three were identified as having low medication adherence. This aligns with the findings of Romadhon et al. (2020), who also observed a correlation between the presence of comorbidities and reduced adherence among diabetic patients. Supporting this, a study titled "Medication Adherence in Type 2 Diabetes Mellitus Patients at Puskesmas in East Jakarta" found that the presence of comorbidities was associated with the highest rate of non-adherence (45.1%). Rasdianah (2016) emphasized that complex medication regimens tend to reduce patient adherence, noting that the more frequent the daily medication dose, the lower the level of adherence. Therefore, simplifying medication regimens is one recommended approach to improving adherence. The data on Characteristics of Respondents Based on Duration of Illness can be seen in Table 7.

Table 7 Characteristics of Respondents Based on Duration of Illness

Duration of Illness	Number (N)	Percentage %)
≤ 3 years	41	48.2
>3 years	44	51.8
Total	85	100

Table 7 shows that most patients had been living with diabetes mellitus for more than three years (44 respondents or 51.8%). Meanwhile, 41 respondents (48.2%) had been suffering for three years or less. Further analysis revealed that among patients who had been ill for three years or less, only one exhibited low adherence to medication. Conversely, among those who had been suffering for more than three years, four respondents demonstrated low adherence. This suggests a potential pattern where patients with a

longer duration of illness tend to be less adherent to their treatment. A possible explanation is that newly diagnosed patients often have higher motivation and stronger expectations for recovery, which positively influences their adherence. In contrast, long-term sufferers may experience treatment fatigue, leading to a decline in adherence over time. Yach (2003b) also highlighted that prolonged illness can negatively impact adherence, particularly when patients become discouraged or overwhelmed by the chronic nature of the disease and the complexity of ongoing treatment.

Table 8. Characteristics of Income

Income	Number (N)	Percentage (%)
< 1 million	69	81.2
1.5 – 3 million	9	10.6
3.5 – 5.5 million	7	8.2
> 5.5 million	0	0
Total	85	100

Based on the characteristics of income in table 8, the majority of diabetes mellitus patients at RSUD Prembun had an income of less than 1 million, with 69 respondents (81.2%). Meanwhile, 9 respondents (10.6%) had an income between 1.5 and 3 million, and the remaining 7 respondents (8.2%) earned between 3.5 and 5.5 million. A person's income is a risk factor for diabetes mellitus and dietary habits. Increased income leads to socioeconomic changes and a shift in lifestyle, including a higher consumption of fast food that is not balanced with knowledge and awareness of nutrition. This ultimately results in high consumption of saturated fats, sugars, low fiber, and insufficient micronutrients, which causes obesity and triggers the onset of diabetes mellitus (Nanda et al., 2018).

In this study, most of the respondents had an income of less than 1 million. However, this did not affect adherence because most patients used BPJS Health insurance for their treatment costs, which alleviates the burden of medical expenses. All diabetes mellitus patients at RSUD Prembun are encouraged to use BPJS Health to ease the financial burden, as their treatment requires routine visits and long-term management. The results of the adherence level based on the MARS-10 questionnaire showed that 80 respondents (94.1%) had high adherence, while 5 respondents (5.9%) had low adherence. The data on adherence levels and the relationship between respondent characteristics and adherence levels can be seen in Tables 9 and 10.

Table 9. Adherence Levels

Adherence Level	Number (N)	Percentage (%)
High Adherence	80	94.1
Low Adherence	5	5.9
Total	85	100

Table 10. Relationship Between Respondent Characteristics and Adherence Levels

Variable	p-value	Description
Age	0.769	Not Significant
Gender	0.048	Significant
Education	0.272	Not Significant
Occupation	0.921	Not Significant
Number of Medications	0.004	Significant
Comorbidities	0.030	Significant
Duration of Illness	0.026	Significant
Income	0.442	Not Significant

Based on the results of the chi-square test in table 10, it was found that there was no significant relationship between medication adherence and the characteristics of the respondents in terms of age, education, occupation, and income, as the p-values were greater than 0.05. However, there was a significant relationship between gender, number of medications, comorbidities, and duration of illness, as the p-values were less than 0.05.

CONCLUSION

There is a significant relationship between the level of adherence to oral antidiabetic medication and patient characteristics, including gender, number of medications, comorbidities, and duration of illness.

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AUTHOR CONTRIBUTION

ADN: Concepts or ideas; design; definition of intellectual content; literature search; experimental studies; data analysis; manuscript preparation.
TCW: definition of intellectual content; literature search; experimental studies; data analysis.
EY: Definition of intellectual content; literature search.
HK: Manuscript editing; manuscript review.

ETHICS APPROVAL

This research had been approved by the ethics commission of Faculty of Health Sciences Universitas Muhammadiyah Gombong with number of 066.6/II.3.AU/F/KEPK/III/2023.

CONFLICT OF INTEREST (If any)

None to declare.

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